FRANEO 800

Sweep frequency response analyzer

The next generation of power transfor

Mechanical or electrical problems in power transformer windings, contacts or cores are the result of:

- extraordinarily high mechanical forces,
- shocks due to transportation and seismic activities, or
- mains power failures such as high short-circuit currents.

Problems such as these will not necessarily lead to a breakdown, but a power transformer's ability to withstand further mechanical loads will be drastically reduced.

These problems can be identified with our new FRANEO 800, the successor to the well-established FRAnalyzer, by using the Sweep Frequency Response Analysis (SFRA) principle.

Worldwide proven measurement method

Since the IEC 60076-18 standard was introduced, the method has become one of the common electrical tests and its acceptance on the market has increased accordingly.

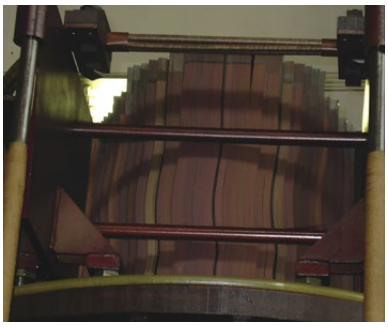
SFRA performs measurements in a frequency domain. It is robust against broadband and narrowband noise and thus, it is able to achieve a high signal-to-noise ratio. SFRA is a non-invasive measurement method and based on a comparison of actual and reference measurements.

mer core and winding diagnosis

With FRANEO 800 and the SFRA being used you can detect defects as well as faults in the magnetic core, the winding assembly, and the clamping structures of power transformers, such as:

- Axial and radial winding deformation
- Displacements between high- and low-voltage windings
- Partial winding collapse
- Shorted or open turns
- Faulty grounding of core or screens
- Core movement
- Broken clamping structures
- Problematic internal connections

As a result you can improve the reliability of your transformers, reduce maintenance costs and, most of all, avoid unexpected and expensive outages.



Deformed core

Collapsed tap winding

Buckling of winding

Displaced internal connections

Your benefits

- Wide dynamic measuring range (> 150 dB)
- Reproducible results thanks to innovative connection technique, based on IEC 60076-18, Method 1
- Guided workflow for test set-up, execution and assessment for easy analysis without expert knowledge
- Fast measurement times due to intelligent sweep algorithm
- Small and light-weight equipment guarantees optimum usability

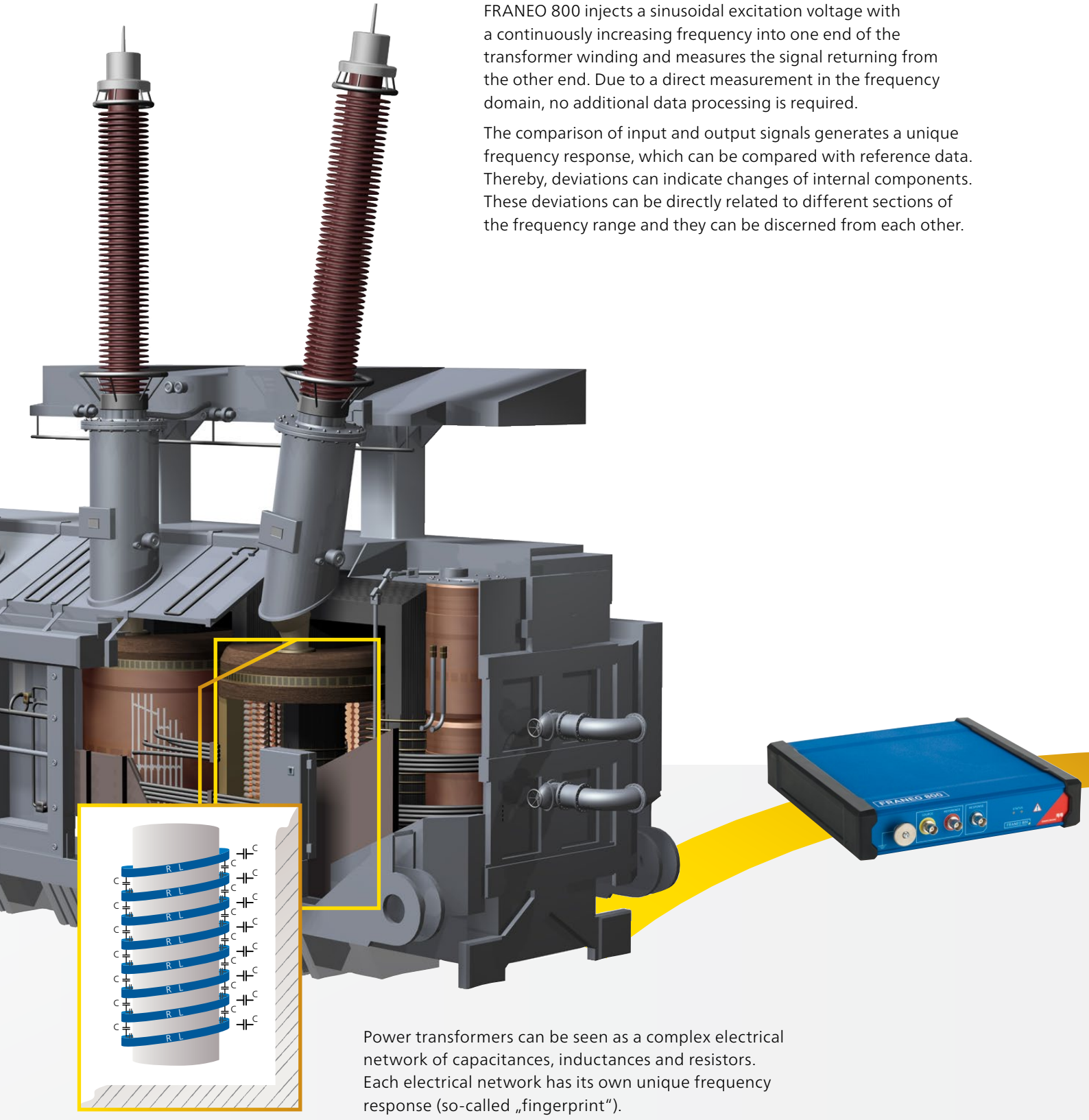
www.omicronenergy.com/FRANEO-800

Sweep Frequency Response Analysis (SFRA)

Measuring principle

FRANEO 800 injects a sinusoidal excitation voltage with a continuously increasing frequency into one end of the transformer winding and measures the signal returning from the other end. Due to a direct measurement in the frequency domain, no additional data processing is required.

The comparison of input and output signals generates a unique frequency response, which can be compared with reference data. Thereby, deviations can indicate changes of internal components. These deviations can be directly related to different sections of the frequency range and they can be discerned from each other.



Power transformers can be seen as a complex electrical network of capacitances, inductances and resistors. Each electrical network has its own unique frequency response (so-called „fingerprint“).

SFRA as basis for further measurements

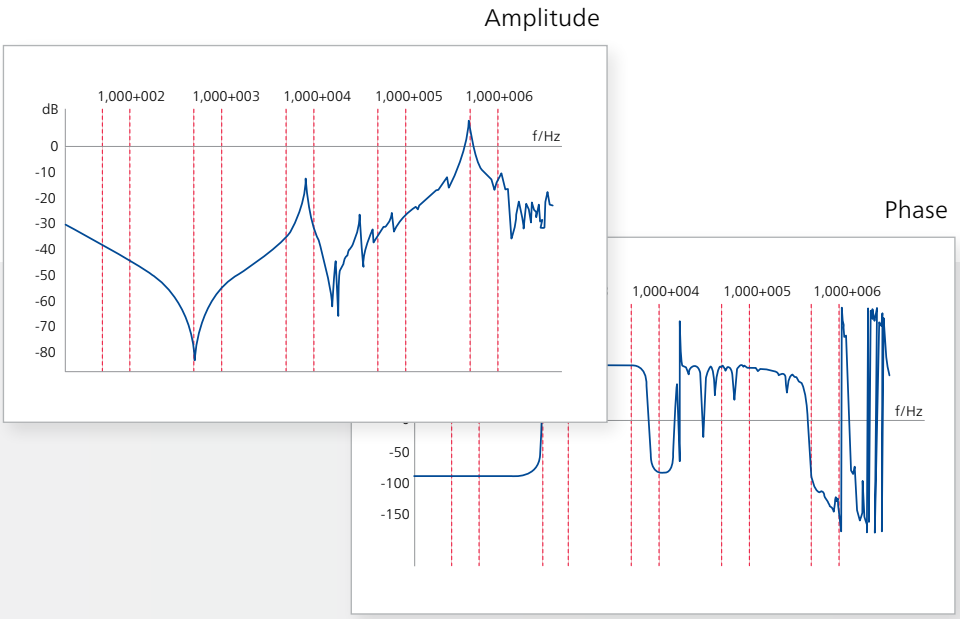
The SFRA measurement technique is the most sensitive diagnostic method for the detection of mechanical deformations. As the SFRA covers a wide frequency range, electrical defects and faults can also be indicated.

Based on the SFRA results you can reliably assess the integrity of your power transformer and, if required, derive further diagnostic measurement techniques, such as leakage reactance, exciting current, or winding resistance measurements. These measurements can be performed with our multifunctional CPC 100 + CP TD12/15.

FRANEO 800 is a very reliable and efficient test set for the classical core and winding diagnosis of power transformers. At the same time, it supports you in the best possible way during the diagnosis of complex defects within the active part of your power transformer.

SFRA combines different advantages:

- Most sensitive method for detecting mechanical and electrial changes within the active part of power transformers.
- Non-invasive measurement method, which allows the assessment of power transformers' integrity without applying high-voltages.
- Comprehensive method, providing additional information to faciltate the condition assessment of the power transformer.



Geometrical changes within and between the elements of the network cause deviations of a transformer's frequency response. FRANEO 800 compares such measurement results with the original fingerprint.

FRANEO 800 – our new solution for a reliable frequency response

Since SFRA is a comparative method, it is vital that measurements become reproducible. This is the only way to guarantee that deviations between an actual measurement and its fingerprint can be related to defects within the observed transformer.

The connections between the measuring device and the transformer terminals, as well as the grounding technique, all have an influence on the reproducibility of your measurement.

Innovative connection technique for the highest level of reproducibility

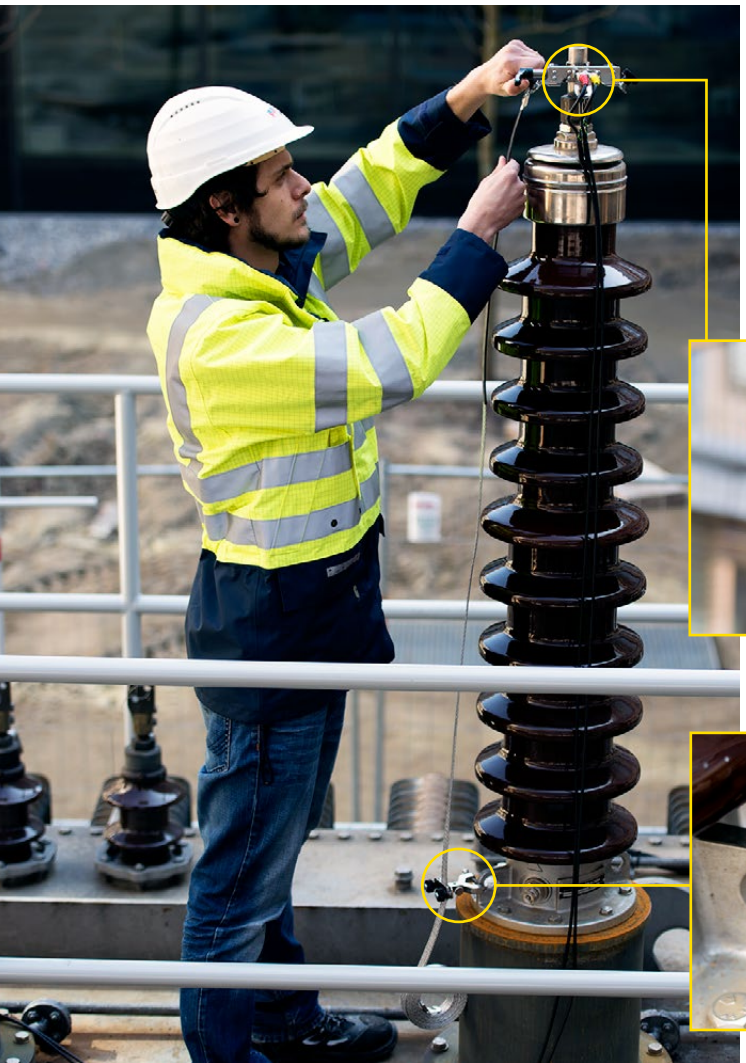
The improved bushing clamps can easily be mounted to transformer bushings, achieving a reliable electrical contact. They provide a high level of cable relief, which increases the longevity of the required accessories.

Ensuring the highest available signal-to-noise ratio, several double shield coax cables are used, which have to be grounded by an additional connection following certain conventions.

Optimum measurement setup with shortest braid concept

Wide flat braids are dedicated for this. They provide a large surface area, the lowest inductance and are less sensitive to interference. This makes the measurement independent from the cable position and significantly increases the level of reproducibilty especially in the high-frequency range area.

In order to eliminate any influence of the grounding system on your measurement results, the grounding braids should always run tightly along the body of the bushings. This is ensured by the specially designed flange-screw clamps and the flexible length of the grounding braids being used.



Due to the special design of the bushing clamps a reliable contact is achieved.

Flange-screw clamps with spikes function as reliable contacts even through layers of paint or dirt.

analysis

Powerful features that give you the best measurement support possible

Highest dynamic range and accuracy

Due to the innovative measurement concept, high precision measurements can be performed with an accuracy of ± 0.5 dB down to -100 dB.

The low noise floor ensures that even strong attentuated measurement traces can be measured with high accuracy. Thereby, FRANEO 800 is able to achieve the best dynamic range (> 150 dB) in the SFRA testing industry.

Variable output voltage

FRANEO 800 now offers you a freely adjustable output voltage from 0.1 V_{pp} to 10 V_{pp} (at 50 Ω). Thus, results of previous measurements with other FRA test devices can easily be compared with new measurements. Making use of the extraordinary dynamic range, the signal-to-noise ratio can be enhanced and the influence of interference reduced by using a higher output voltage.

Intelligent sweep settings

The intelligent sweep settings shorten the measurement duration significantly. The implemented algorithm first performs a broadband measurement and then focusses on the critical frequency areas, achieving more precise measurement results.

In order to be able to support future comparisons of new FRANEO 800 results with previous results, different sweep setting profiles can be selected.

Ground Loop Check

The integrated 'Ground Loop Check' verifies the test set-up and makes sure that the grounding braids are properly connected. It gives you a "Pass/Fail" assessment and either allows or prevents you from continuing with your measurement. This internal check guarantees reproducible measurement results.

One solution in one box for easy and comfortable testing

With FRANEO 800 you get all the required components in just one box. This makes testing quite comfortable and the system easy to transport. Its newly developed, extremely robust housing is ideal for on-site testing. With the powerful integrated battery, you can also perform tests in environments without a power supply.

Step by step through the test procedure with Primary Test Manager™

The Primary Test Manager™ (PTM) is the ideal software tool for the diagnostic testing and condition assessment of your power transformers.

Operating FRANEO 800 with PTM means being compliant with applicable international IEC and IEEE standards and guidelines (IEC 60076-18 and IEEE C57.149-2012), while keeping your testing time to a minimum.

Management of location, asset and test data

PTM provides a well-structured database for managing SFRA and additional transformer test results to get a comprehensive overview of your asset's condition. You can define and manage locations, assets, jobs and reports in an easy and fast way.

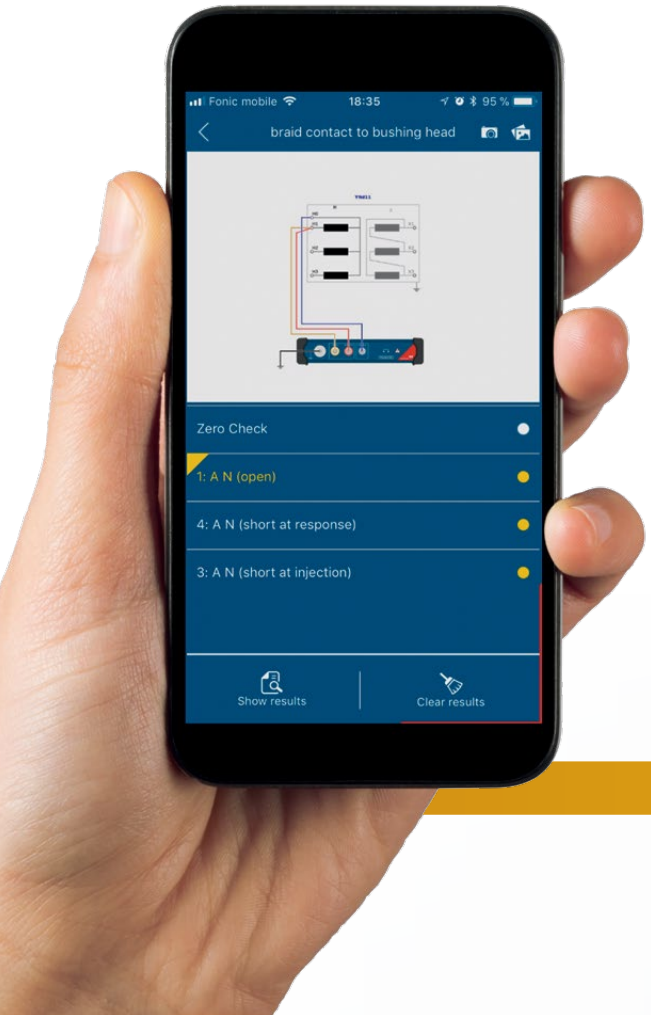
Import and export functionality

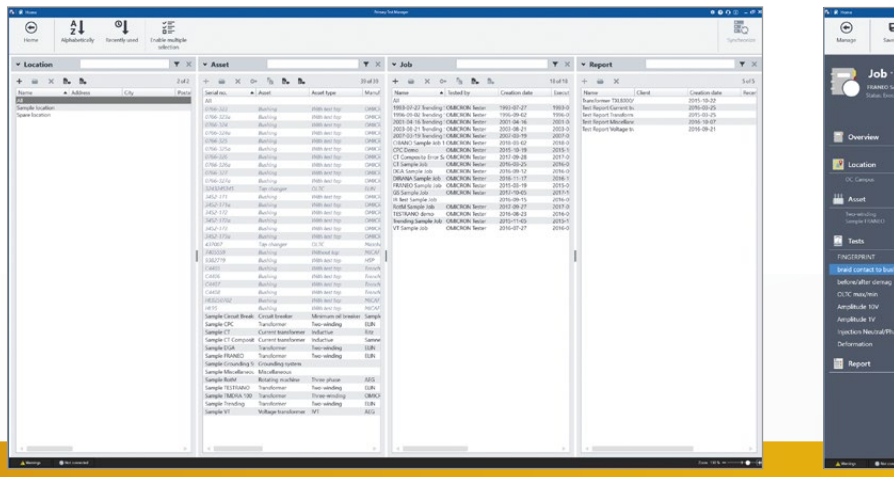
Measurements performed and stored with the old FRAnalyzer database, can easily be imported in the new PTM database, using the migration assistant wizard that is included. In addition, data can be filtered or exported in common formats such as XML, PDF, Microsoft® Word, Microsoft® Excel.

Data synchronization and back-up

With the 'PTM DataSync' module, you can synchronize your local database with a PTM server database. The server database collects the test data from every user connected to the server. Thus, data synchronization and storage are safer and more convenient than they have ever been before.

Get the PTMate app free of charge in the App Store and Google Play Store!





Easy management of location, asset and test data due to a structured database, implemented search and filter functions and automatic data synchronization.

Execution of diagnostic tests

You can select between several predefined test templates. These templates fully comply with current standards and guidelines and always consider the nameplate values that have already been entered. You can also create your own test templates for your individual needs.

Easy connection due to wiring diagrams

Pre-configured wiring diagrams, that depend on the selected vector group of your power transformer, assist you with setting up the test equipment in the correct manner. This minimizes the likelihood of measurement errors and speeds up your testing process.

PTMate app – your mobile companion

PTMate is our mobile companion for PTM. The app supports you on site and extends the PTM feature set to your smartphone, such as easy data entering, fast and safe wiring for tests, as well as starting and stopping of SFRA measurements when using FRANEO 800.

Result analysis and reporting

After the measurement a reference test of the same transformer will be selected automatically. FRANEO 800 provides you with a mathematical solution for comparing the traces based on the Chinese standards DLT 911/2004 or NCPRI. This is a powerful tool for assessing the mechanical and electrical integrity of your power transformer.

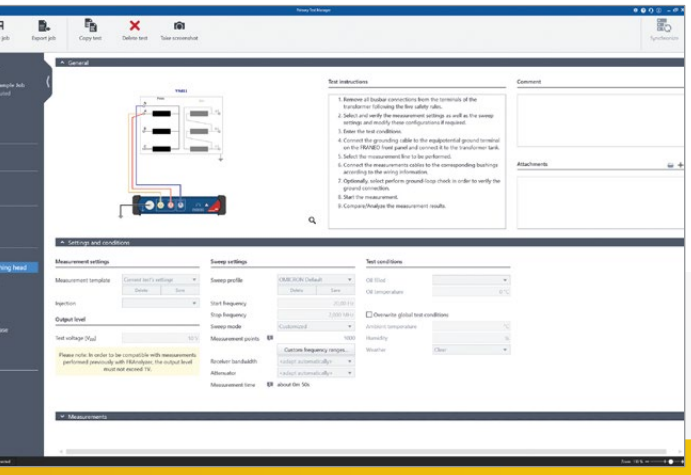
Comparison tools for detailed analysis

For a detailed analysis you can compare different test results side-by-side in one diagram. You can choose between a time- and type-based comparison as well as a phase-based comparison.

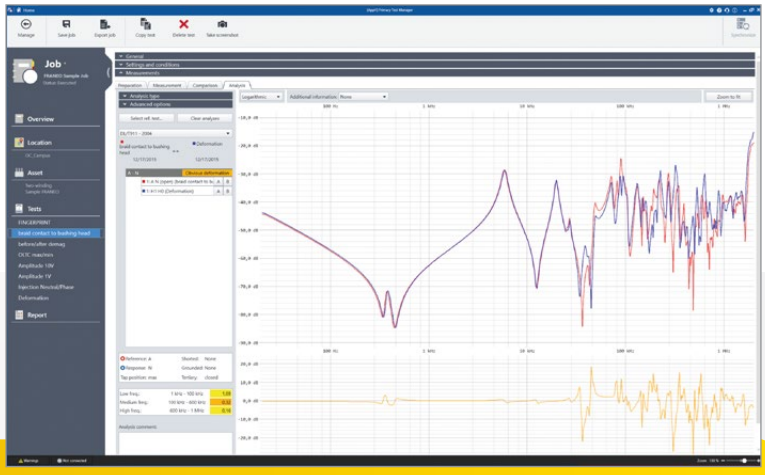
Customized, individual reports

PTM can automatically generate reports for SFRA and any further measurements, e.g. leakage reactance, exciting current or winding resistance. This gives you a comprehensive overview of your power transformer, its test results, and its assessment.

You can easily adapt the reports to your needs, e.g. compile the included parts, provide comments or incorporate your company logo.



PTM supports you in the best possible way during execution of diagnostic tests via wiring diagrams and asset-specific test plans according to international standards.



For a comprehensive analysis, PTM offers automatic result assessment and comparison as well as customized reporting.

FRANEO 800 + EIC1 – Instrument Transformer testing solution for

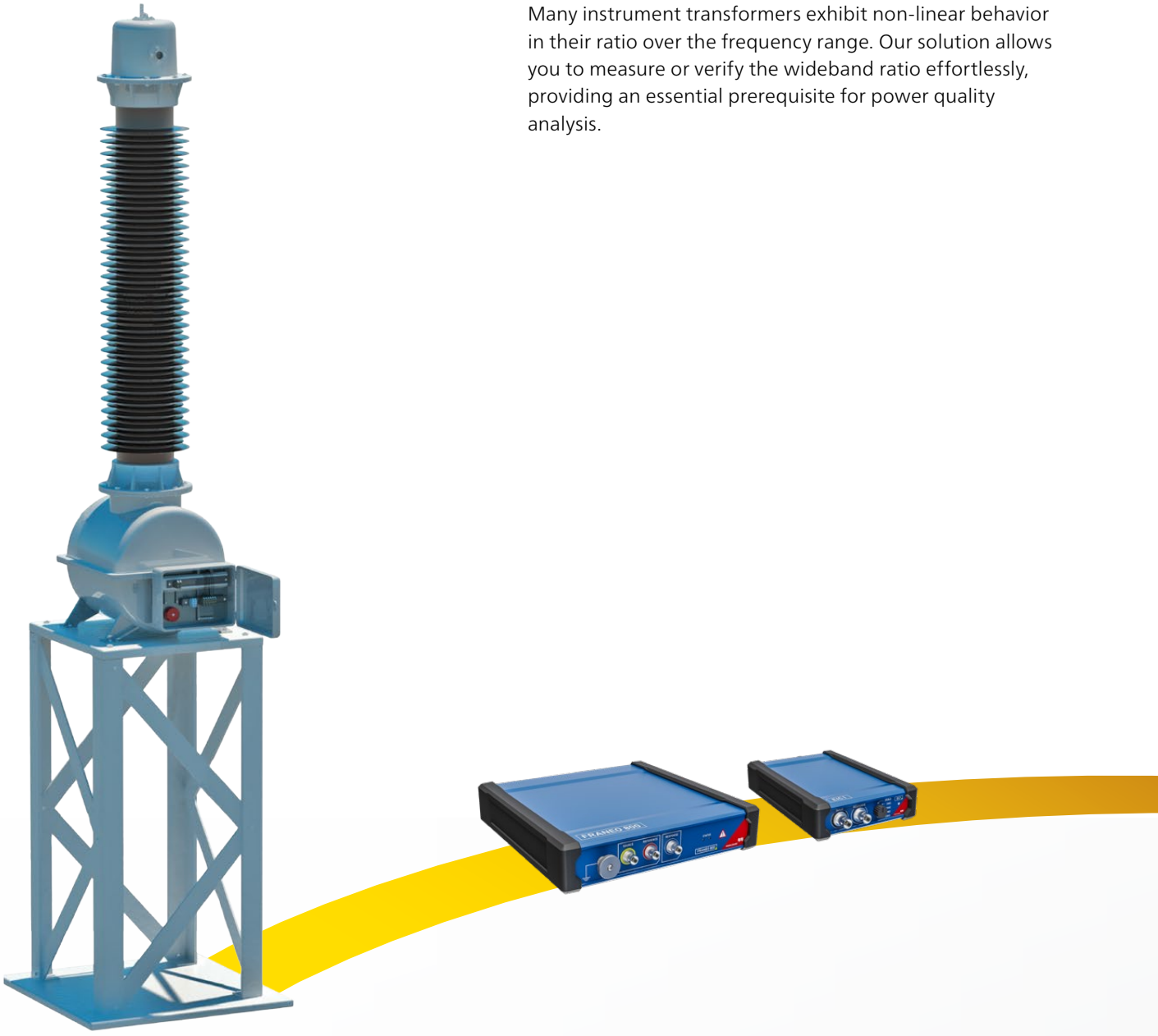
This package is aimed at testing instrument transformers used for power quality applications. With this portable solution, you'll be able to perform wideband ratio measurements quickly and accurately across the entire relevant frequency range.

Measuring principle

The wideband ratio and phase accuracy is tested with FRANEO 800, a leading SFRA mesurement device. With the Electronic Impedance Converter (EIC1) accessory, the input impedance (burden) of the test setup can be adapted to the test object for optimal results. The software FRANEO PQlyzer for Instrument Transformers is a dedicated software tool especially developed for this application. It provides a guided workflow and easy analysis, saving, and reporting of the test results.

Wideband Ratio Measurements

Many instrument transformers exhibit non-linear behavior in their ratio over the frequency range. Our solution allows you to measure or verify the wideband ratio effortlessly, providing an essential prerequisite for power quality analysis.



power quality application

EIC1 Accessory

The EIC1 is an electronic impedance converter specifically designed to match the burden of your instrument transformer or low-power instrument transformer.

Conveniently select the burden range using the small dial on the EIC1 to achieve optimal results during testing.

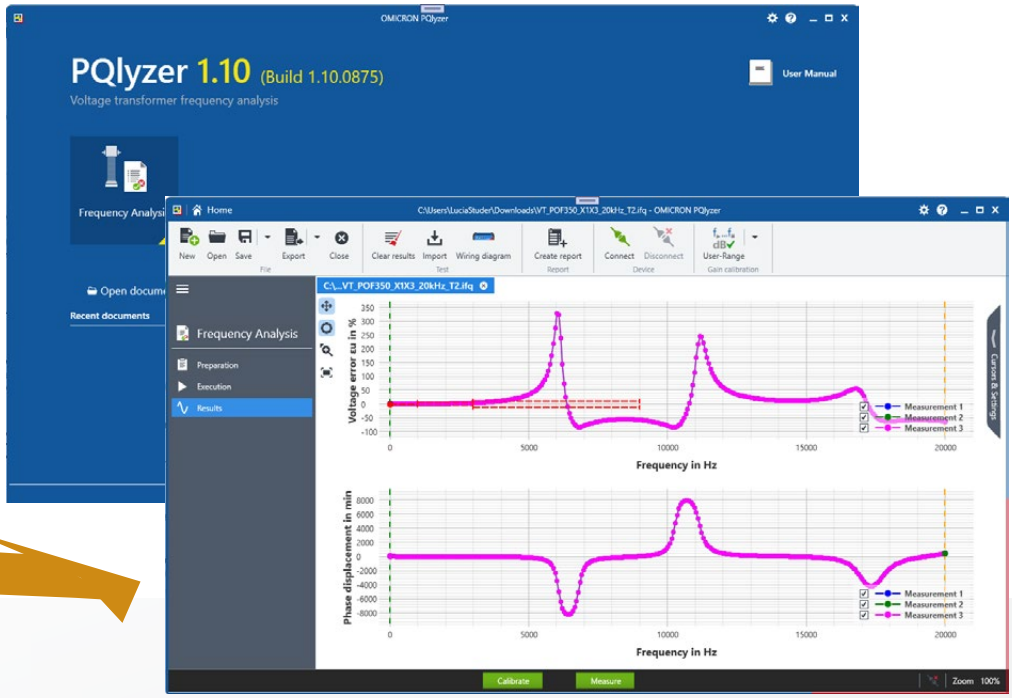
FRANEO PQlyzer Software

Tailored for instrument transformer wideband ratio applications, our dedicated test software guides you through the entire testing workflow.

Easily store your test files and generate comprehensive reports for efficient analysis.

Power Quality (PQ) measurment advantages:

- > Ensure safety and reliability of the grid assets
- > Maintain high integrity of the supply grids
- > Help asset owners meet compliance requirements



Our PQlyzer software provides optimal support for measuring the transfer characteristics of instrument transformers using configurable sweep settings, wiring diagrams, and reporting for easy use.

Technical data and ordering information

Technical data FRANEO 800

General

Frequency range	1 Hz ... 30 MHz

Source output

Output impedance (for f = 20 Hz...2 MHz)	50 Ω (± 2%)
Connector	BNC
Amplitude	10 V_{pp} (at 50 Ω)
Dynamic range (for f = 20 Hz...2 MHz)	> 150 dB (+10 dB ... < -140 dB noise $floor_{RMS}$)

Attentuation/Accuracy

(for f = 20 Hz...2 MHz)

Typical accuracy	± 0.1 dB (down to -50 dB) and ±0.3 dB (between -50 dB and -100 dB)
Guaranteed accuracy	± 0.3 dB (down to -50 dB) and ±0.5 dB (between -50 dB and -100 dB)

Mechanical data

Dimensions (w x h x d)	252 x 53 x 265 mm / 10 x 2 x 10.4 in
Weight	1.8 kg / 4 lbs (without measuring cables)

Environmental

Temperature	Operating:	-10 °C ... + 55 °C / + 14 °F ... + 131 °F
	Storage:	-35 °C ... + 55 °C / + 31 °F ... + 131 °F
Relative humidity		20% ... 95%, non-condensing

System requirements[1] for PTM

Operating system	**Windows 10™, 64-bit** **Windows 8™ and 8.1™, 64-bit** **Windows 7™ SP1**, 32-bit and **64-bit**
CPU	**Multicore system with 2 GHz or faster** Single core system with 2GHz or faster
RAM	minimum 4 GB (**8 GB**)
Hard disk	minimum 5 GB of available space
Storage device	DVD-ROM drive
Graphics adapter	Super VGA (1280×768) or higher-resolution video adapter and monitor[2]
Interface	USB 2.0[3], Ethernet NIC[4]
Installed software[5]	**Microsoft Office® 2016,** Office® 2013, Office® 2010 or Office® 2007

[1] Recommended system requirements marked in bold
[2] Graphics adapter supporting Microsoft® DirectX 9.0 or later is recommended.
[3] USB 2.0 is needed for operation with FRANEO 800 and DIRANA.
[4] The Ethernet NIC is need for operation with CPC 100 and CIBANO 500.
[5] Installed software required for the optional Microsoft Office® interface functions.

FRANEO 800 packages

	Description	Ordering No.
FRANEO 800 Standard Package	Package for performing sweep frequency response analysis (SFRA) on power transfromers, featuring the FRANEO 800 device, dedicated bushing and flange clamps, the aluminium braids as well as the Primary Test Manager™ (PTM) software for easy operation.	P0005860

FRANEO 800 Quick Connection Package	Package for performing sweep frequency response analysis (SFRA) on power transformers, featuring the FRANEO 800 device, all-in-one cables (incl. ring reference ground connection and easy-to-connect clamps) as well as the Primary Test Manager™ (PTM) software for easy operation.	P0005861

FRANEO 800 IT PQylzer Package	Package for performing power quality (PQ) measurements and monitoring purposes on conventional or low power instrument transformers.	P0010291

Packages upgrade options

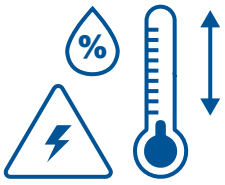
FRANEO 800 accessories and upgrades

	Description	Ordering No.
Clamp Set for Short Bushings	2 x Short aluminum braids (1.5 m / 5 ft), 2 x Clamps in a carry bag	P0006313
IT PQlyzer Upgrade Package for FRANEO	Upgrade option for performing power quality (PQ) measurements and monitoring purposes on conventional or low power instrument transformers.	P0010290
Quick Connection to IT PQlyzer Upgrade Package for FRANEO	Upgrade option to expand your existing quick connection SFRA test system for performing power quality (PQ) measurements and monitoring purposes on conventional or low power instrument transformers.	P0010295
IT PQlyzer to Standard Upgrade Package for FRANEO	Upgrade option to expand your existing Power Quality (PQ) test system for performing sweep frequency response analysis (SFRA) on power transfromers. Free download of Primary Test Manager software from my.omicronenergy.com	P0012096
Quick Connection Upgrade Package for FRANEO	Upgrade option to expand your existing standard SFRA test system to a quick connection package.	P0006324

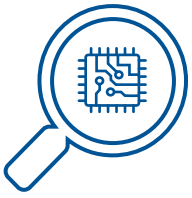
We create customer value through ...

Quality

Highest safety and security standards

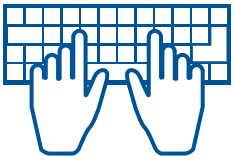


Up to 72 hours burn-in tests



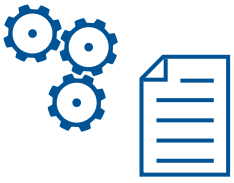
100% routine testing for all components

Innovation



>200 developers keep our solutions up-to-date

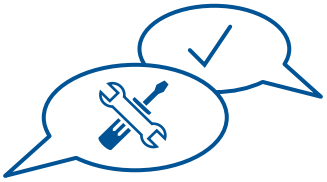
Reinvestment >15% in R&D



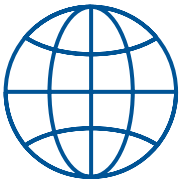
Up to 70% time saving through automation

Support

Professional technical support

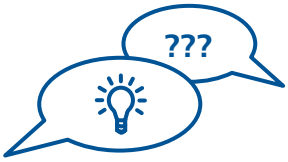


Cost-effective repair & calibration



25 offices worldwide

Knowledge



>300 Academy trainings per year

OMICRON hosted training & events

Free papers & application notes

OMICRON is an international company that works passionately on ideas for making electric power systems safe and reliable. Our pioneering solutions are designed to meet our industry's current and future challenges. We always go the extra mile to empower our customers: we react to their needs, provide extraordinary local support, and share our expertise.

Within the OMICRON group, we research and develop innovative technologies for all fields in electric power systems. When it comes to electrical testing for medium- and high-voltage equipment, protection testing, digital substation testing solutions, and cybersecurity solutions, customers all over the world trust in the accuracy, speed, and quality of our user-friendly solutions.

Founded in 1984, OMICRON draws on their decades of profound expertise in the field of electric power engineering. A dedicated team of more than 900 employees provides solutions with 24/7 support at 25 locations worldwide and serves customers in more than 160 countries.

For more information, additional literature, and detailed contact information of our worldwide offices please visit our website.

www.omicronenergy.com